

REMARKS

STATUS OF CLAIMS

Claims 3, 5, 6, 13, 16, and 24-39 have been cancelled herein.

Claims 4, 17-23, and 33 were previously cancelled in response to the first Office Action.

Claims 1, 2, 7-12, and 14-15 have been amended.

Claims 40-59 have been added.

No claims have been withdrawn.

Claims 1, 2, 7-12, 14-15, and 40-59 are currently pending in the application.

SUMMARY OF THE REJECTIONS

Claims 1-3, 5-10, 14-16, 24-32, and 34-39 have been rejected under 35 U.S.C. § 102(e) as allegedly anticipated by U.S. Patent Number 6,421,711 issued to Blumenau et al. ("*Blumenau*"). Claims 11-13 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Blumenau* in view of U.S. Patent Number 6,620,109 issued to Ofer et al. ("*Ofer*"). The rejections are respectfully traversed.

RESPONSE TO THE REJECTIONS

A. CLAIM 1

(1) INTRODUCTION TO CLAIM 1

As amended above, Claim 1 features:

“A computer-implemented method of allocating storage to a host processor, comprising:
a ***control processor*** receiving a request to allocate storage to the host processor; and
the ***control processor*** associating one or more logical units from among one or more storage units to the host processor by:
the ***control processor*** configuring a gateway device to map the one or more logical units to the host processor;
the ***control processor*** configuring the one or more storage units to give the host processor access to the one or more logical units;

wherein the *control processor* is separate from the *gateway device*, the *host processor*, and the *one or more storage units*; and

wherein the *gateway device* is separate from the *control processor*, the *host processor*, and the *one or more storage units*.” (Emphasis added.)

Thus, Claim 1 features that the “control processor” performs the steps of receiving, associating, and configuring. Furthermore, in Claim 1, both the control processor and the gateway device are “separate from” each other and from both the host processor and the one or more storage units. As a result, the approach of Claim 1 for associating storage with the host processor employs both the control processor and the gateway device that are separate from the host processor for which storage from the one or more storage units is being allocated. Thus, the *capability of associating the storage* from the storage units with the host processor *is embodied within the control processor* that acts in conjunction with the gateway device to allocate the storage to the host processor.

The changes to Claim 1 are fully supported by the specification, and no new matter is added. For example, the performing of the steps of Claim 1 by a “control processor” is supported by at least Claims 3, 5, and 6. As another example, FIGs. 3A, 3B, and 3C all illustrate that control processors 312 and 320A-320N are separate from hosts 302A-302N, 302D, storage gateway 306, storage units 304A-304N, and disk arrays 304C, 304D. As yet another example, FIGs. 3A and 3B both illustrate that storage gateway 306 is separate from hosts 302A-302N, control processors 312 and 320A-320C, storage units 304A-304N, and disk array 304D.

(2) INTRODUCTORY DISCUSSION OF *BLUMENAU*

In contrast to the approach of Claim 1, *Blumenau* discloses an approach for modifying a storage unit referred to as a “cached storage subsystem” to allow for the use of virtual ports by hosts to access storage within the cached storage subsystem. Specifically, the cached storage subsystem 20 includes a storage controller 27 that further includes port adapters 35, 36 that are programmed to provide a plurality of virtual ports and a virtual switch, both of which are defined by software, for routing storage access requests from a physical port of the storage controller to the virtual ports. (Abstract; Figures 1, 21, and 22.) To partition the storage of

cached storage subsystem among different hosts, the virtual ports are assigned to each host and the storage volumes associated with each virtual port are made accessible from each host. (Abstract.)

Note that in the approach of *Blumenau*, it is the storage controller 27 of the cached storage subsystem 20 that is modified to include the virtual ports as part of port adapters 35, 36. (See Figures 1, 21, and 22.) In order to accommodate additional cached storage subsystems (e.g., as with cached storage subsystems 531, 532 in Figure 39 and cached storage subsystems 541, 542 of Figure 40 of *Blumenau*), the storage controller of each cached storage subsystem is modified as in Figures 1, 21, and 22.

(3) INTRODUCTORY ISSUES REGARDING THE OFFICE ACTION'S CITATIONS FROM *BLUMENAU*

In the rejections of the claims based on *Blumenau*, the Office Action does not explicitly state what feature(s) of *Blumenau* correspond to the "one or more storage units" of the claims. However, from the Office Action, it appears to the Applicant that the Office Action's rejections are based on equating the "cached storage subsystem" of *Blumenau* to a "storage unit" as used in the claims, and therefore, the following response is based on this understanding. This is consistent with Figures 39 and 40 of *Blumenau* and the associated discussion in the description of *Blumenau* in Columns 41 and 42 that address the extension of the previous discussion that used only one cached storage subsystem to multiple cached storage subsystems. If this is not correct, the Applicant respectfully requests that the next communication from the Office specify what feature(s) disclosed in *Blumenau* are being taken to show the "one or more storage units" of the claims.

In addition, the Office Action does not explicitly state what feature(s) of *Blumenau* correspond to the "control processor" of the claims. However, from the Office Action, it appears to the Applicant that the Office Action's rejections are based on equating the "fibre channel switch" of *Blumenau* to the "control processor" as used in the claims, and therefore, the following response is based on this understanding. If this is not correct, the Applicant respectfully requests that the next communication from the Office specify what feature(s) disclosed in *Blumenau* are being taken to show the "control processor" of the claims.

In addition, the Office Action does not explicitly state what feature(s) of *Blumenau* correspond to the "gateway," "storage gateway," "plurality of storage gateways," and "disk

gateway” of the claims. However, from the Office Action, it appears to the Applicant that the Office Action’s rejections are based on equating the “gatekeeper” of *Blumenau* to the “gateway,” “storage gateway,” “plurality of storage gateways,” and “disk gateway” as used in the claims, and therefore, the following response is based on this understanding. If this is not correct, the Applicant respectfully requests that the next communication from the Office specify what feature(s) disclosed in *Blumenau* are being taken to show the “gateway,” “storage gateway,” “plurality of storage gateways,” and “disk gateway” of the claims.

(4) SUMMARY OF THE DISCUSSION OF THE OFFICE ACTION’S CITATIONS FROM *BLUMENAU*

To summarize the following arguments, the approach of Claim 1 features the use of a control processor and a gateway device, which are both separate from each other and from the host processor and storage units, to allocate storage from the storage units to a host processor, whereas the approach of *Blumenau* is based on modifying the cached storage subsystem itself to include the use of virtual ports and virtual switches to allocate storage from within a particular cached storage subsystem to different hosts. Thus, the approach of Claim 1 is fundamentally different than the approach of *Blumenau* because Claim 1 uses an “intermediary” type of entity, namely the control processor, that has the capability to allocate storage from the storage units by configuring a separate gateway device, whereas *Blumenau* modifies the cached storage subsystem (e.g., the storage unit) itself to include virtual ports and virtual switches that have the capability of allocating storage from within the cached storage subsystem to the hosts, without the use of an intermediary type of entity such as the control processor as in the approach of Claim 1.

(5) DETAILED DISCUSSION OF THE OFFICE ACTION’S CITATIONS FROM *BLUMENAU*
REGARDING THE “CONTROL PROCESSOR”

The Office Action first addresses the “control processor” in the rejection of Claim 3, and that portion of the rejection of Claim 3 is addressed herein in the discussion of Claim 1 because Claim 1, as amended above, now features the “control processor” performing the steps of “receiving,” “associating,” and “configuring.” As discussed above, the Office Action is equating the “control processor” of the claims to the “fibre channel switch” of *Blumenau*.

Specifically, the Office Action states in the rejection of Claim 3 that *Blumenau* discloses that “the configuring step [now the associating step] is carried out by a control processor....(at least col. 11, lines 3-30; Fig. 1; col. 31, lines 9-61,...fibre channel switch.” Yet in the rejection of Claim 1, the Office Action states that the three “configuring steps” are disclosed in *Blumenau* in “at least col. 31, lines 9-51; col. 33, line 53 – col. 34, line 50;...at least col. 32 line 13 – col. 33 line 17;...at least col. 31, lines 9-51.”

However, the “fibre channel switch” is only discussed in the first cited portion of *Blumenau*, in Column 11, lines 3-30, in which *Blumenau* describes the fabric of a “Fibre Channel Network” and that “temporary identifiers of ports in the network are assigned by the fabric at the time of a fabric login if the fabric supports a fabric login. Otherwise, the temporary identifiers must be known by the ports implicitly.” (*Blumenau*, Col. 11, lines 3-7.) The remainder of this cited portion of Column 11 of *Blumenau* describes how the temporary identifiers are assigned for either a single switch or multiple switches, including both an implicit name server login and an explicit name server login. (Col. 11, lines 7-30.)

Significantly, none of this discussion relating to Fibre Channel switches of Column 11 of *Blumenau* describes anything relating to the “configuring steps” of Claim 1 that, according to Claim 3 previously and now in Claim 1 as amended above, are performed by the “control processor.” Finally, the Office Actions’ rejection of Claim 3 also relies on Figure 1 of *Blumenau*, which illustrates nothing relating to a Fibre Channel switch, and relies on nearly all of Column 31 that appears under the heading “HOST INVOLVEMENT IN VOLUME CONFIGURATION AND MAPPING,” which again describes nothing relating to a Fibre Channel switch.

Yet in the rejection of Claim 1 relies upon most of Columns 31-34, which addresses both the “**HOST INVOLVEMENT IN VOLUME CONFIGURATION AND MAPPING**” and the “**HOST REQUESTS FOR DYNAMIC ALLOCATION AND DE-ALLOCATION OF LOGICAL VOLUMES**,” (emphasis added,) and the Applicant is at a loss to see how the discussion of Columns 31-34 used in rejecting Claim 1 is related to the discussion of the Fibre Channel switch of Column 11. Because Claim 3 features that the configuring step of Claim 1 is performed by a “control processor” that the Office Action is equating to a Fibre Channel switch, then there would need to be some discussion within *Blumenau* or at least some discussion within the Office Action of how the Fibre Channel switch performs the functions

described in Columns 31-34 that is used in rejecting the steps of Claim 1. Yet both *Blumenau* and the Office Action lack any discussion or other indication of how a Fibre Channel switch is involved in the functions of Columns 31-34. Thus, the Applicant respectfully submits that the Office Action has not established the basis for rejecting the features of Claim 3 that the control processor performs the “configuring” of Claim 1, which is now incorporated into Claim 1, as amended above.

As best understood by the Applicant, the discussion of Columns 31-34 focus on the role of a “host” in the virtual port approach of *Blumenau*, specifically the configuration and allocation of volumes for hosts and the role of the host in that process, including the use of a logical volume in a cached storage subsystem as a “boot disk” for the host. Yet Claim 1, as amended herein, features that the “control processor” performs the steps of “receiving,” “associating,” and both “configuring” steps, and that the “control processor” is separate from the “gateway device, the host processor, and the one or more storage units.” Furthermore, the approach of *Blumenau* is focused on the creation and use of virtual ports and virtual switches that are part of the port adapters within the storage controller of the cached storage subsystem (see Figures 21 and 22 of *Blumenau*), and thus, the approach of *Blumenau* is not capable of being implemented separate from the cached storage subsystem. Yet the steps of Claim 1 are performed by a “control processor” that is expressly featured to be “separate” from the storage units.

Therefore, the Applicant respectfully submits that Claim 1 is allowable over *Blumenau* because the discussion of Columns 31-34 in *Blumenau* describe the role of the host, whereas Claim 1 expressly recites that the steps are performed by a “control processor” that is “separate from...the host processor.”

(6) DETAILED DISCUSSION OF THE OFFICE ACTION’S CITATIONS FROM *BLUMENAU*
REGARDING THE “GATEWAY(S)”

As described above, the Office Action is equating the “gateway,” “storage gateway,” “plurality of storage gateways,” and “disk gateway” as used in the claims to the “gatekeeper” as described in *Blumenau*. As featured in the amended Claim 1 above, a “gateway device” is included that is configured by the control processor “to map the one or more logical units to

the host processor.” Furthermore, as featured in Claim 1 above, the “gateway device is separate from the control processor, the host processor, and the one or more storage units.”

However, *Blumenau* describes the “gatekeeper” or “gatekeeper facility” as being part of the cached storage subsystem, specifically that the “gatekeeper” is a logical volume on the cached storage subsystem for storing configuration information about which hosts are mapped to which volumes within the cached storage subsystem. For example, the first mention of the “gatekeeper” is in Column 31 that states “the configuration information is stored in a predefined logical volume, such as a volume accessed at LUNO, that functions as a gatekeeper device.” Thus, the so-called “gatekeeper” in the approach of *Blumenau* is nothing more than a “predefined logical volume” that is part of the cached storage subsystem. (Col. 31, lines 24-26.) Similarly, *Blumenau* later states that “a host could read the primary copy of the configuration information in the “gatekeeper” volume of storage in the storage subsystem.” (Col. 32, lines 18-20.)

Also, *Blumenau* describes that the “mount” and “unmount” commands “would be sent to the storage subsystem gatekeeper (e.g., at LUNO)...the gatekeeper facility responds to the mount command by allocating free logical storage volumes to the specified LUNs, and creating an entry in the volume access table or tables for the specified volume group name and the LUN to logical volume mappings.” (Col. 33, lines 36-39 and lines 53-57.) Each of the other references to the “gatekeeper” are consistently with these descriptions that the gatekeeper is part of the cached storage subsystem. (See Col. 34, lines 7-10; Col 34, lines 40-44; Col. 35, lines 34-41; Col. 35, lines 50-52; and Col. 36, lines 20-23.)

Therefore, the Applicant respectfully submits that Claim 1 is allowable over *Blumenau* because Claim 1 features that the “gateway device is separate from the control processor, the host processor, and the one or more storage units,” whereas the “gatekeeper” in *Blumenau* that is relied upon by the Office Action as disclosing the “gateway” is part of the cached storage subsystem (e.g., a storage unit).

(7) CONCLUSION OF DISCUSSION OF CLAIM 1 AND *BLUMENAU*

Because *Blumenau* fails to disclose, teach, suggest, or in any way render obvious that “the *control processor* is separate from the *gateway device*, the *host processor*, and the *one or more storage units*...,” that the “control processor” performs the steps of “receiving,”

“associating,” and “configuring,” or that “the **gateway device** is **separate from** the **control processor**, the *host processor*, and the *one or more storage units*...,” the Applicant respectfully submits that, for at least the reasons stated above, Claim 1 is allowable over the art of record and is in condition for allowance.

C. CLAIMS 40 AND 50

Claims 40 and 50 contain features that are the same to those described above with respect to Claim 1, and in particular both Claims 40 and 50 feature the “control processor” performing the steps of receiving, associating, and configuring and that the control processor and the gateway device are “separate from” each other and from both the host processor and the one or more storage units, which is the same as in Claim 1. Therefore, based on at least the reasons stated above with respect to Claim 1, the Applicant respectfully submits that Claims 40 and 50 are allowable over the art of record and are in condition for allowance.

D. CLAIMS 2, 7-12, 14-15, AND 41-59

Claims 2, 7-12, and 14-15 are dependent upon Claim 1, Claims 41-49 are dependent upon Claim 40, and Claims 51-59 are dependent upon Claim 50, and thus include each and every feature of the corresponding independent claims. Each of Claims 2, 7-12, 14-15, and 41-59 is therefore allowable for the reasons given above for Claims 1, 40, and 50. In addition, each of Claims 2, 7-12, 14-15, and 41-59 introduces one or more additional limitations that independently render it patentable. However, due to the fundamental differences already identified, to expedite the positive resolution of this case a separate discussion of those limitations is not included at this time. Therefore, it is respectfully submitted that Claims 2, 7-12, 14-15, and 41-59 are allowable for the reasons given above with respect to Claims 1, 40, and 50.

CONCLUSION

The Applicant believes that all issues raised in the Final Office Action have been addressed and that allowance of the pending claims is appropriate. After entry of the amendments, further examination on the merits is respectfully requested.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.


For the reasons set forth above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a formal Notice of Allowance is believed next in order, and that action is most earnestly solicited.

To the extent necessary to make this reply timely filed, the Applicant petitions for an extension of time under 37 C.F.R. § 1.136.

If any applicable fee is missing or insufficient, throughout the pendency of this application, the Commissioner is hereby authorized to any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,

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on 9/27/2005 by Trudy Bagdon